C1

A power semiconductor component receives the voltage applied to it through mutual depletion of neighboring p- and n-conductive regions by mobile charge carriers, so as to create a space charge zone. In an n-channel power MOS field-effect transistor, spatially fixed charges created in a p-conductive well hence find their "mirror charges" primarily in a vertically adjacent n-conductive layer, which is normally produced by epitaxy. The maximum of the electric field always occurs at the pn junction between the p-conductive well and the semiconductor body. Electrical breakdown is reached when the electric field exceeds a material-specific critical field strength E_c: this is because multiplication effects then lead to the creation of free charge carrier pairs, so that the blocking-state current suddenly increases greatly. But since, as is known, charges are the sources of any electric field, this critical field strength E_c can be assigned an equivalent critical breakdown surface charge Q_c according to the first Maxwell equation. For silicon, for example, $E_c = 2.0 \ldots 3.0 \times 10^5$ V/cm and $Q_c = 1.3 - 1.9 \times 10^{12}$ charge carriers cm^{-2}. Since each charge carrier has the charge of e (electronic charge = 1.6×10^{-19} As), Q_c can take values from $2.08 - 3.04 \times 10^{-7}$ $As.cm^{-2}$. The exact value of Q_c depends in this case on the level of the doping.

The paragraph starting on page 14, line 17 and ending on page 15, line 4 now reads:

C2

In accordance with an added feature of the invention, the layer thickness of the semiconductor body has a specific charge density ρ in a direction z between the pn junction and the second main surface such that:

$$\int_0^W \rho(z)dz \le 0.9Q_c$$

in which Q_c, the critical breakdown surface charge denotes a critical value of the breakdown surface charge Q at which the electrical breakdown is reached, said charge quantity Q being linked to said electric field strength E between said first electrode and said second electrode by the above equation $\int_0^W \rho(z)dz \le Q$ and Poisson's equation $\nabla E = -4\pi\rho$.

The paragraph starting on page 20, line 4 and ending on page 20, line 23 now reads:

C3

Sub D2

The critical value E_c of the field strength is linked to a charge density ρ by Poisson's equation

$$\vec{\nabla}.\vec{E} = -4\pi\rho, \qquad (1)$$

so that a relationship with a critical breakdown surface charge Q_c can be derived:

C3 cont.

$$\int_0^{W_{sc}} \rho(z)dz \leq Q_c \qquad (2)$$

W_{sc} denotes the width of the space charge region (i.e. the region with $|\vec{E}| \neq 0$) when the electric field reaches the critical field strength E_c. According to the invention, the layer thickness W should then be selected in such a way that the space charge zone reaches the second main surface 3 before the field strength takes on the critical value E_c. In this case, the integration in following equation (3) has to be carried out over the entire layer thickness W of the semiconductor body 1 between the pn-junction between the semiconductor body 1 and the body zone 4 and the second semiconductor surface 3. In other words, the integral in Equation (2) should, for example, reach at most the value 0.9 Q_c so that, in the vertically structured power semiconductor component according to the invention, the following equation is satisfied:

$$\int_0^{W} \rho(z)dz \leq 0.9Qc \, . \qquad (3)$$

The paragraph starting on page 22, line 6 and ending on page 22, line 16 now reads: